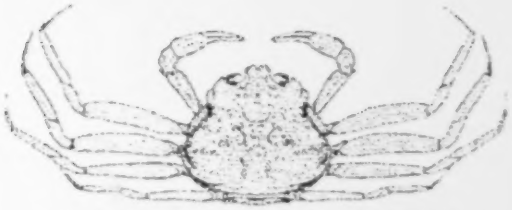
Fisheries and Oceans Pêches et Océans

Newfoundland Region

DFO Science
Stock Status Report #C2-01 (1999)



STOCK STATUS REPORT NEWFOUNDLAND AND LABRADOR SNOW CRAB

Background

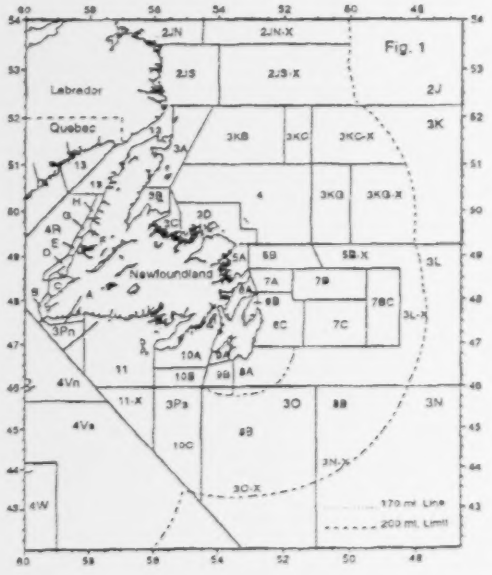
Snow crab, Chionoecetes opilio, occur over a broad depth range in the Northwest Atlantic from Greenland to the Gulf of Maine. In Newfoundland and Labrador there are no known barriers to larval drift or settlement, or other evidence to indicate distinct stocks. Commercial sizes are more common on mud or mud/sand bottom while smaller crabs are more common on gravel or small rocks. The snow crab diet includes clams, polychaete worms, brittle stars and other crustaceans. Predators include various groundfish, other snow crabs and seals.

Males continue to molt until they develop large claws, which enhances their ability to mate. This happens during a final molt which may occur over a wide size range (40-110 mm carapace width (CW)). Females cease molting when they first spawn, at smaller sizes (40-75 mm CW). It is believed that snow crab may live 5-6 years after the terminal molt.

The minimum legal size in the fishery is 95 mm CW. This regulation excludes females from the fishery while generally ensuring adequate numbers of sexually mature males in the population for reproduction.

The Newfoundland fishery began in Trinity Bay in 1968. Initially, crabs were taken as gillnet by-catch but within several years there was a directed trap fishery in inshore areas along the northeast coast of the Island during spring through fall. Until the early 1980's the fishery was prosecuted by approximately 50 vessels, limited to 800 traps each. In 1981 fishing was restricted to the NAFO Division where the licence holder resided. During 1982-87 there were major declines in the resource in traditional areas in 3K and 3L while at the same time licences supplemental to groundfishing were issued in 3K in 1985, in 3L in 1987 and in 2J in the early 1990's. Since 1989 there has been a further expansion in the offshore.

In the late 1980's quota control was initiated in all management areas of each Division, the season was also shortened and timed differently for the two fleet sectors (fulltime and supplementary). A dock-side monitoring program designed and managed by fishers to control quotas and quality was initiated in 1994. Temporary seasonal permits for vessels <35 ft. were introduced in 1995 all around the Island. There are now four fleet sectors: fulltime, supplementary >40 tons, supplementary <40 tons, and temporary seasonal. All sectors have designated trap limits, quotas and trip limits, fishing areas within Divisions, and differing seasons. Management of the increasingly diverse fishery led to the development of 41 quota-controlled areas (Fig. 1) with over 3300 licence/permit holders under enterprise allocation by 1998. It is not possible to provide scientific information at this fine scale of management. Starting in 3L in 1999, management will attempt to realign and reduce the number of areas.



Canada

The Fishery

Landings have been increasing steadily since the late 1980's and reached a record high of 52,600 t in 1998 (Fig. 2, Table 1). Most of this increase came from Div. 3K and 3L and largely from expansion of the fishery to offshore areas.

Effort, as indicated by estimated trap hauls, has approximately tripled since the late 1980's. The distribution of effort in 1998 is shown in Fig. 3. Overall, recent catch rates have remained high, except for Div. 4R (Table 1), although they have been quite variable among individual management areas.

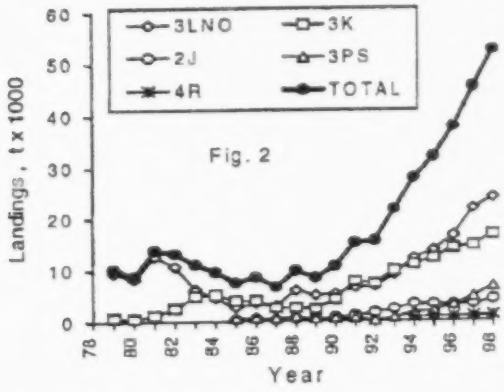
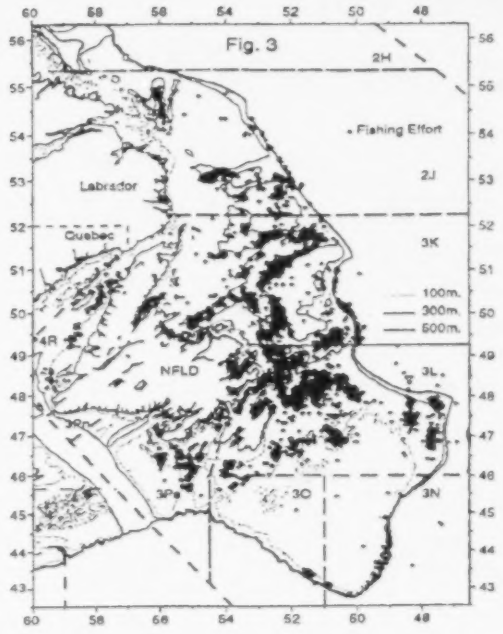


Fig. 2

Table 1. Landings (t) and commercial catch rate (kg/trap haul) by NAFO Division, 1992-98.

Div.	1992	1993	1994	1995	1996	1997	1998
2J	1,529 (12.5)	2,275 (12.9)	2,978 (9.6)	3,178 (7.9)	3,090 (10.2)	3,166 (11.9)	4,081 (14.5)
3K	7,295 (12.0)	9,760 (14.5)	11,039 (13.4)	12,245 (11.5)	14,190 (12.2)	14,830 (11.8)	16,814 (13.5)
3LNO	6,652 (12.7)	8,979 (14.3)	12,237 (15.7)	13,790 (17.0)	16,656 (15.0)	22,185 (14.8)	24,028 (16.1)
3Ps	121 (9.4)	704 (10.6)	1,590 (15.2)	1,853 (10.0)	3,047 (16.6)	4,753 (20.2)	6,615 (20.7)
4R	-	-	655 (5.5)	920 (5.9)	833 (5.9)	969 (3.6)	1,063 (5.0)



Div. 2J: Landings increased from 3,200 t in 1997 to 4100 t in 1998. An increase in catch rate since 1995 is attributed to continued expansion into unfished areas as well as a recovery of catch rates in traditional areas.

Div. 3K: Landings increased to 16,800 t in 1998 from 14,800 t in 1997. The overall catch rate has remained high and ranged from 12 to 14 kg/trap haul in the last several years. A portion of Green Bay (Area 3C, Fig. 1) was closed to fishing from June because of a high incidence of soft shell crab. An exploratory fishery was initiated in 1997 to determine the commercial potential of offshore grounds deeper than 550 m. This was expanded in 1998 with catch rates comparable to those for traditional offshore grounds achieved. Instances of Bitter Crab Disease (BCD) were again reported by many fishers and dock-side monitors.

Div. 3LNO: Landings from Div. 3LNO, totalled 24,000 t in 1998, up from 22,200 t in 1997. Catch rates have remained high (15-17 kg/trap haul) in most areas over the past several years with the exception of St. Mary's Bay (Area 9A, Fig. 1) where it declined for the second year in a row despite decreases in quota. Highgrading, first reported in 1996 but supposedly eliminated by a formal agreement between the harvesting and processing sectors, continued in 1998 as indicated by dock-side monitors and at-sea observers. Reports of BCD in the deep-water bays within Division 3L have increased since 1996.

Div. 3Ps: Landings increased to 6,600 t in 1998, up from 4,700 t in 1997. Catch rates remained high in all areas. An unregulated fishery developed adjacent to area 10A (Fig. 1) in 1996. This fishery, prosecuted by 7 vessels from St. Pierre and Miquelon, landed 356 t in 1998.

Div. 4R: 1998 landings overall were 1,100 t, up from 1,000 t in 1997. Catch rate recovered slightly to 5.0 kg/trap haul following a decline in 1997. The overall quota (1,327 t in 1998) has not been caught since temporary permits were first issued in 1995.

Resource Status

Commercial Catch Rates

Because of numerous changes to the fishery and problems these have created regarding reporting, year-to-year changes in catch rates have not been used to infer changes in stock status. However, it is possible to interpret catch rates in the context of longer-term trends. Commercial catch rates in the 1990's were considerably higher than in the 1980's, and have remained stable through 1998.

Inshore Trap Surveys

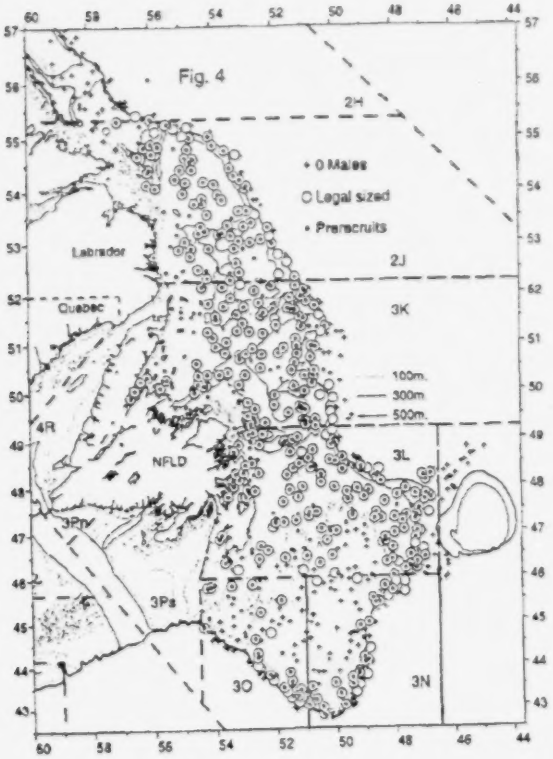
Research surveys using commercial and small-meshed traps have been carried out in three crab management areas in Div. 3L since the early 1980's; 5A–Bonavista Bay, 6B-Conception Bay, and 6C-Northeast Avalon (Fig.1). Sampling with a small shrimp trawl has been conducted since 1996 as well. Survey catch rates of legal-sized crabs from commercial traps reflect the long-term trend in commercial catch rates. Preliminary analysis of the shrimp trawl data indicates that this gear can effectively catch very small crabs. A longer time series is required in order to evaluate its utility as an early indicator of relative year-class strength.

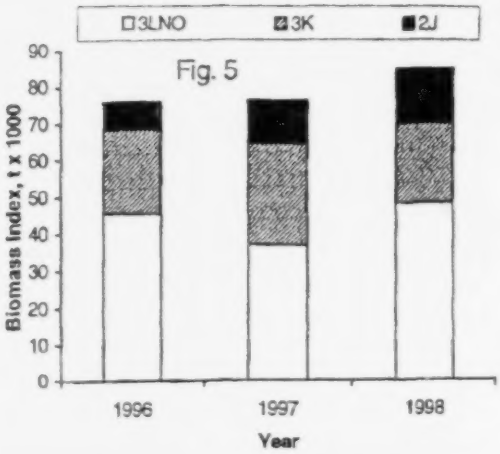
A Div. 3K research survey, also using commercial and small-meshed traps, has been conducted in the White Bay-Notre Dame Bay area (Area 3B-D, Fig. 1) during September of 1994-1998. Survey results showed a regular increase in catch rate of intermediate-sized (40-75 mm) prerecruits in inshore strata over the past 5 years.

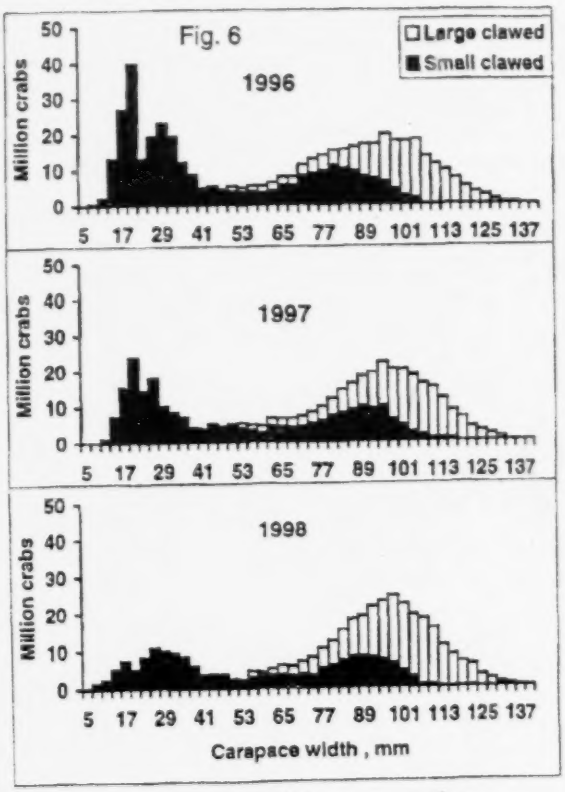
Bottom Trawl Surveys

Data from fall multispecies bottom trawl surveys in Div. 2HJ3KLNO during 1996-1998 were used. Surveys were conducted near the end of the fishing season. They sampled an extensive area of snow crab distribution and the entire size range. Males were broadly distributed throughout the survey area (Fig. 4). They were virtually absent north of 2J, on the slope of the continental shelf deeper than about 800 m, and across most of the shallow southern Grand Bank. Legal-sized crabs predominated in catches at greatest depths near the shelf edge, smaller crabs predominated in shallower water, especially near the coast, and a mixture of sizes

occurred at intermediate depths over most of the shelf (Fig. 4). Estimates indicate a stable biomass of legal-sized crabs in 3KLNO and an increase in 2J (Fig.5). The ratio of commercial catch to biomass index for the survey area was 0.40 and 0.39 in 1997 and 1998 respectively. Because the catchability of the Campelen survey trawl is believed to be less than 1, the overall exploitation rate has not exceeded 40% in the past two years.







Size distributions reflect the stable commercial biomass over the past 3 years (Fig. 6) and indicate that continued strong recruitment to legal size is expected for 1999. Uncertainties exist regarding the efficiency of the Campelen trawl in sampling sublegal-sized crabs (40-75 mm) which would begin to recruit to commercial size two years after the survey year. Therefore, it is not possible to predict recruitment to the exploitable biomass in the intermediate term. Abundance estimates of small crab (carapace width less than 40 mm) have declined in fall survey catches from 1996-1998.

Data were also available from spring multispecies bottom trawl surveys conducted in Div. 3P during 1996-1998. Generally, catches of legal-sized crabs were localized in the eastern portion of 3Ps. Biomass estimates were unreliable, highly variable, and trends could not be interpreted.

No research data were available for 4R.

Bitter crab disease

BCD became evident during the mid-1990's. Information on BCD has been collected from the commercial fishery, dock-side grading, observer reports, inshore trap surveys, and bottom trawl surveys. The fall bottom trawl surveys indicate that the disease is most prevalent in Div. 3K and is virtually absent in Div. 3NO. All information suggests that its incidence remains low overall but it may be increasing in large crabs. It has been questioned whether increased exploitation in the short term would reduce loss of yield. However BCD is primarily found in sublegal-sized crabs, so increased exploitation would not address this problem.

Sources of Uncertainty

There is uncertainty in biomass indices among divisions due to wide confidence intervals. This uncertainty is greatest for Divisions 3NO and 3P. Although the catchability of the survey trawl is unknown, experimental work clearly indicates that it is less than 1. As a result, actual exploitation rate, while lower than the ratio of catch to survey biomass index, is unknown. In addition, there is uncertainty as to the upper limit of exploitation rate which may be sustainable. There is also uncertainty regarding the efficiency of the survey trawl in sampling sublegal-sized crabs smaller than 75 mm, which would begin to recruit to legal size 2 years after the survey year. Therefore it is not possible to predict recruitment to the exploitable biomass in the intermediate term.

There is uncertainty associated with determining the relative effects of changes in abundance versus changes in fishing practices on trends in commercial catch rates. Interpretation of data is compromised by falsification of logbook information. Mortality of legal-sized crabs due to highgrading has not been accounted for and represents an additional but unquantified source of fishing mortality. Mortality of both sublegal-sized and soft-shelled crab due to handling practices may be considerable, especially during warmest months. Effects of this mortality on recruitment are uncertain. Bitter crab disease is most prevalent in sublegal-sized crabs and its effects on recruitment are uncertain.

Outlook

Commercial fishery data for Div.3P indicate a stable commercial biomass.

Commercial catch rates in 4R remain stable at a much lower level than in other divisions. The overall 4R quota has not been caught since temporary permits were first issued in 1995.

Both the commercial fishery and fall bottom trawl surveys indicate a stable commercial biomass that has been broadly distributed throughout Div. 2J3KLNO in recent years. The sustained high fall survey biomass in 1998, together with prospects for continued strong recruitment to legal size in 1999 indicate that the exploitable biomass will be maintained for 1999.

Prospects for recruitment beyond 1999 are uncertain.

For more Information:

Research Documents:

References

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